

UNIVERSITY OF IDAHO

Infectious Disease Biotechnology

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Take Home Message

- Research in Infectious Disease has been successful in Idaho
- A moderate investment by the state can be leveraged to bring in large amounts of federal and company dollars
- The State should continue to support biomedical research
- The State should provide ways for companies to take Idaho biotech discoveries to the marketplace

UI Infectious Disease Research

- Broad categories of Infectious Disease Research
- One Specific example of a successful project (SEC)
- Our experience as scientists

INFECTIOUS DISEASE AREAS

- PLANTS
 - Plant pathology
 - Diagnostics and surveillance
 - Plant biotechnology
 - Breeding programs (resistance esp. wheat, potato, bean)
 - Edible vaccines (human GI infections)
- ANIMALS
 - Diagnostics and surveillance
 - Basic/applied animal health & well-being research
 - Animal models for human infections
- HUMAN

Human INFECTIOUS DISEASE AREAS

Basic Research (Molecular and Cellular)

- Bacteria
 - Staphylococcal wound infections, food poisoning, toxic shock syndrome, and mastitis
 - *E. coli* diarrhea and vascular/kidney failure
 - Streptococcal wound infections and toxic shock syndrome
 - Gas gangrene
 - Plague
 - Tularemia
- Viruses
 - Rhinovirus (colds/hoof and mouth)
 - Cytomegalovirus (birth defects)
- Parasites
 - Toxoplasma (toxoplasmosis)

Human INFECTIOUS DISEASE AREAS

Applied Research (Biotechnology)

- Vaccines (Conventional and Biosecurity Agents)
 - Uses in human and animal infectious diseases
- General Immunostimulants (Adjuvants)
- Anti-Cancer Therapy
- Antibiotics/Antimicrobial Compounds

One Example of Biotech from Infectious Disease Basic Research

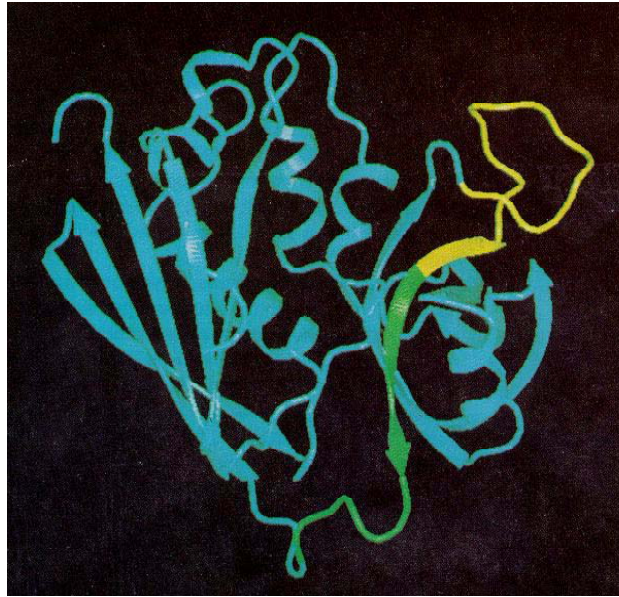
- Superantigen Therapy

STAPH is no Laugh!

- *Staphylococcus aureus*
 - Toxic shock syndrome
 - Staphylococcal food poisoning
 - Immunosuppression
- Toxins are superantigens



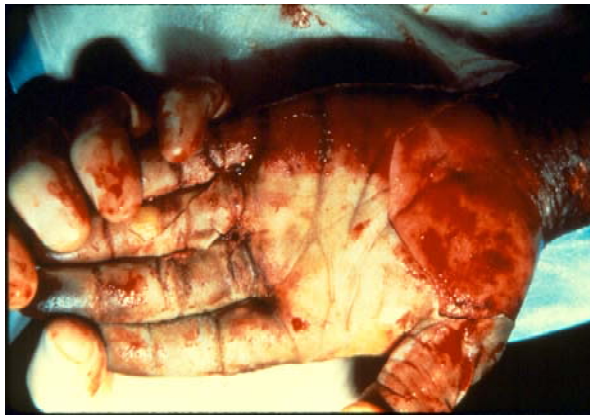
Staphylococcal enterotoxin type C (SEC) superantigen



- Over-stimulation of the immune system
- Abnormal stimulation of the immune system

STAPHYLOCOCCAL Toxic Shock Syndrome

- SUPERANTIGEN IN DISEASE
 - Toxic shock syndrome
 - Over-stimulation



Staphylococcal Mastitis

\$2 billion in lost revenues in U.S.

- SUPERANTIGEN IN DISEASE
 - Immunosuppression
 - Abnormal stimulation



STAPHYLOCOCCAL ENTEROTOXIN C1 (SEC1) MUTANT

Retain immunostimulation
without toxicity or immunosuppression

native



mutant



SUPERANTIGEN THERAPY

- SEC1M USE IN BOVINE MASTITIS
 - Acquisition of USDA SBIR
 - (Idaho Immunodiagnostics, Inc.)
 - Cooperation with LG Life Sciences, Inc.
 - Initial clinical trials confirmed reduction in Somatic Cell Counts
 - Ongoing trial for effects on clinical mastitis



LG LIFE SCIENCES, Inc.

- Funding for past and ongoing field studies
- Licensing agreement for veterinary applications



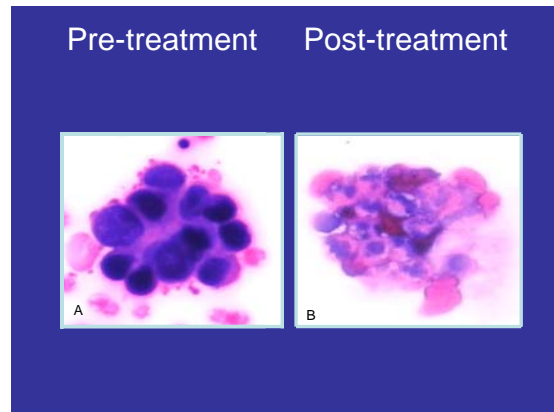
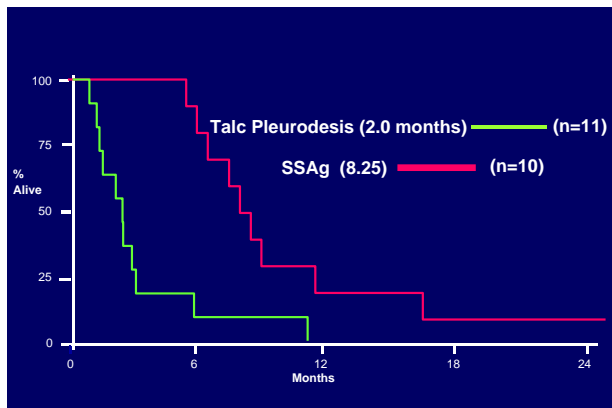
Govenor Kempthorne, Dr. Yang, Dr. Park, Mr. Garber, Dr. Bohach

Non-specific augmentation of the Immune Response

- Can superantigen therapy be used as an anti-cancer therapy?
- Can superantigen therapy be used to protect the population from a bioterrorist threat?

SUPERANTIGEN THERAPY

- Anticancer therapy:
 - Non-Small Cell Lung Cancer with Effusions
 - Collaboration with Jenquest, Inc.; Carmel, CA

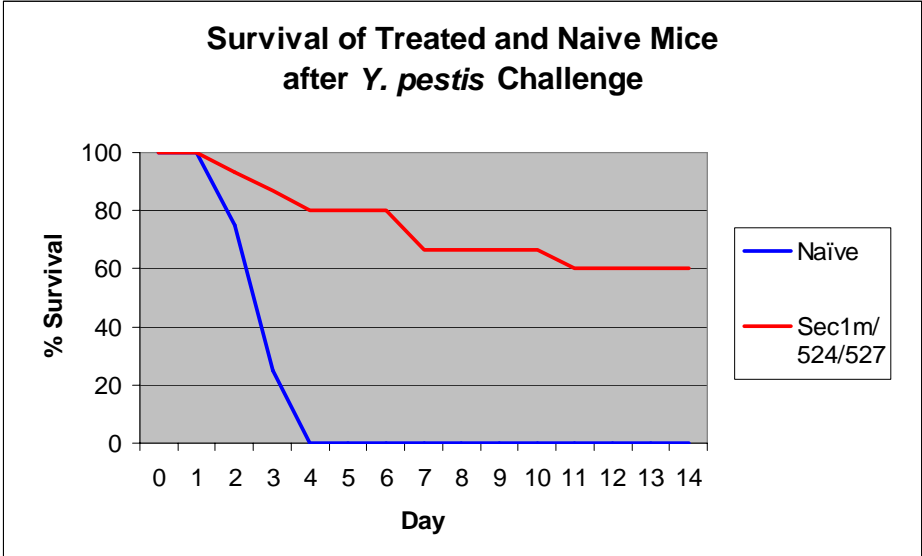


Y. pestis

- Causative agent of Plague
- Aerosolized *Y. pestis*
 - Breath in one bacterial cell
 - Death in 1-4 days

SUPERANTIGEN THERAPY

Non-specific protection by augmenting
a generalized immune response



Strengths and Opportunities (Human Infectious Diseases)

- Critical Mass and Diverse Expertise (12 Faculty)
- NIH COBRE AND NIH INBRE Funding
- Potential for integrating with EPSCoR funding
- Close Link Between Biomedical and Agriculture Research
 - Zoonotic Infections and Broad Host-Range Bacteria
- Scientific cooperation (UI, BSU, ISU, VA)
- Sophisticated Cell and Molecular Biology Infrastructure
 - \$32 million in competitive Federal funding since 1988 (mostly NIH)
 - Bioinformatics (NIH and NSF funding)
 - Cell Separation And Analysis
 - Confocal and Electron Microscopy
 - Proteomics and Genomics Labs
 - BSL-3 Facility and Availability of Biodefense Funds

Weaknesses and Threats

(Human Infectious Diseases)

- Faculty Retention (Competition with Medical Schools)
- Inadequate statewide internet technologies to take advantage of NIH Lariat funding
- Lack of Local (Idaho) Corporation Partners
 - Need to Look Globally
 - Inadequate resources to take advantage of SBIR programs

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